

THE REVIEW

DEVOTED TO THE INTERESTS OF THE AMERICAN SOCIETY FOR METALS

Volume XI

APRIL, 1938

No. 4

Practical Talks
Supplement to
Boston CourseRegistration for Six Evening
Meetings Totals 173; Course
Based on Grossmann Book

By R. F. Harrington

The 1938 educational program of the Boston Chapter consisted of a short but intensive course of six lectures supplemented by talks upon practical applications in the industry.

A most fortunate selection was made in securing Dr. Morris Cohen, assistant professor of metallurgy, Massachusetts Institute of Technology, as the principal speaker. He proved to be most able and interesting and made his subject very understandable.

An excellent choice was also made in connection with the speakers on practical applications—namely, Messrs. Hawkrig, Walsted, Bartholomew, and Bach, all past chairmen of the Boston Chapter.

The program of the course was as follows:

- Jan. 13. The Iron-Carbon Diagram — Prof. Cohen
- Jan. 20. Annealing and Normalizing — Prof. Cohen
- Current Mill Practice — Leslie D. Hawkrig
- Jan. 27. Hardening—Prof. Cohen
- Heat Treatment in the Modern Industrial Plant—John P. Walsted
- Feb. 10. Tempering and Hot Quenching — Prof. Cohen
- Specific Applications—E. L. Bartholomew
- Feb. 17. Case Hardening—Prof. Cohen
- Practical Cyaniding and Nitriding—A. D. Bach, Jr.
- Feb. 24. Grain Size; Equipment; Summary—Prof. Cohen

There was a total registration of 173, the first lecture attracting about 160. The attendance held up remarkably well up to the final lecture—a distinct tribute to Dr. Cohen.

While the "Principles of Heat Treatment" by Dr. Marcus A. Grossmann was followed somewhat as a text, Dr. Cohen presented considerable original and additional material which added significantly to his lecture.

For the benefit of those who desired Grossmann's book, the committee purchased fifty copies.

The lively discussion which followed each lecture clearly indicated the interest in the various lectures offered by the Boston Chapter. The comments from many of those in attendance were indeed most complimentary.

As a direct result of the lectures, approximately 15 persons have joined the Chapter.

Ohio Groups Hear Forbes

By R. E. Christin

"Recent Developments in Cast Iron" was the subject for the March meetings of Columbus, Dayton and Cincinnati Chapters.

Duncan P. Forbes, president, Gunite Foundries Corp., Rockford, Ill., was the speaker. His talk has already been reviewed in this paper, and published in METAL PROGRESS last February.

In Columbus, the meeting was held at the Battelle Memorial Institute with the auditorium completely filled. About 100 members and guests attended.

Good reports of interest in this lecture were received from Dayton and Cincinnati, the latter reporting the largest attendance of the year and very lively discussion followed the meeting.

West Coast Show Is
Largest Exposition
Held in Los Angeles

The largest industrial exposition ever held in Los Angeles ended on March 25 when the third Western Metal Congress and Exposition and the first held since 1931 came to the end of a record-breaking and highly successful week of activities.

A total of 36,394 people attended the Exposition of 158 metal producing and working firms at the Pan-Pacific Auditorium. This building during the week of the Convention recorded the largest electrical load ever used on an exposition in Los Angeles.

Registered attendance at the Congress included 3096 engineers, and technical sessions, which featured more than 100 papers, were an outstanding drawing card to the tune of an estimated attendance of about 5000.

Dr. Bates's five-day lecture course on "Fundamentals of Ferrous Metallurgy" was likewise a popular feature and drew a daily audience averaging 450.

John Disario, metallurgist, Columbia Steel Co., Torrance, Calif., as general chairman of the Congress Committee, opened events with an address of welcome on Monday morning, March 21, to which National President Waterhouse responded.

Technical programs were also presented by the A.S.M.E. and A.W.S., and 15 other technical societies were represented in the Congress.

Stotz Lecture Is High Spot

York Chapter enjoyed one of the high points of its current lecture season on March 16 when Norman I. Stotz, metallurgical engineer for the Universal-Cyclops Steel Corp., lectured on the subject of "A Modern Picture of High Speed Steel."

Mr. Stotz's lecture was not only one of the best of the current season, but one of the best lectures the Chapter has heard on high speed steel. It was briefly abstracted in the March issue of THE REVIEW.

For Detroit Show



The Imposing Entrance to Convention Hall in Detroit Where the 20th National Metal Exposition Will Be Held the Week of Oct. 17 to 21, 1938

Cincinnati Tools Discussion
Group Has Final Meeting

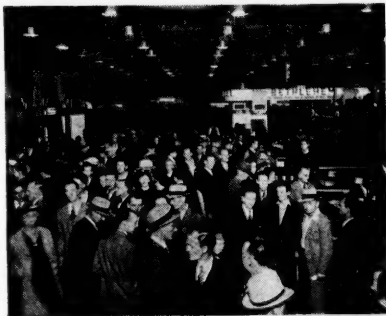
"Metal Cutting" was the subject of the final meeting of the "Tools" Discussion Group of the Cincinnati Chapter held on March 14. Mario Martelotti, research engineer, Cincinnati Milling Machine Co., was the discussion leader.

The various points discussed were, briefly, as follows:

1. Progress made to date in the art of metal cutting, the machine tool, and materials used in the cutting tool.
2. Action of the cutting tool.
3. The path described by a milling tooth.
4. Effect of clearance and rake angles on the formation of a chip, and on the quality of surface finish.

A micro motion picture of the cutting tool in action clearly showed the cutting action and chip formation. Excellent slides and graphs were used as illustrations, and many good points were brought up and thoroughly discussed during the question period.

Crowds Visit Western Metal Congress



A Typical Evening Crowd Is Shown at Left Inspecting the Exhibits Displayed by 158 Firms in the Pan-Pacific Auditorium in Los Angeles March 21 to 25. The group below represents an attendance which averaged 450 at the course of five lectures presented daily during the Congress by Dr. A. Allan Bates. The stellar attraction, who should be on the platform at the right, somehow missed the picture

Convention Hall
Exhibit Spaces
Are Assigned

Subjects Selected for Lecture Courses and Symposium at National Metal Congress

Convention Hall, 4464 Cass Ave., has again been chosen as the ideal building in Detroit to house the 20th National Metal Exposition held in conjunction with the National Metal Congress Oct. 17 to 21, 1938.

Two previous metal shows in Detroit (in 1933 and 1927) were also held at Convention Hall.

The Statler Hotel will be headquarters for the American Society for Metals, sponsors of the Congress and Exposition.

Floor plans of Convention Hall have already been mailed to all previous exhibitors in metal expositions and reservations are rapidly coming in. Definite space assignments were made on April 19 and the floor plans given general distribution to the trade.

Plans and papers for the technical sessions are rapidly taking shape under the direction of A.S.M. Assistant Secretary Ray Bayless and Program Committee Chairman Allan Bates. An important feature of the technical program will be a symposium on the subject of "Hardenability."

Subject of the five-day lecture course, now an established feature of the Congress, will be "Machinability." The lectures this year will be presented by five different authorities on various aspects of the subject.

A supplementary three-lecture evening course on "Pyrometry" will be presented by Robert B. Sosman, Research Laboratory, United States Steel Corp., Kearny, N. J.

Be, Cr, Co, Ti Are Among
Alloys Added to Copper
To Confer Age Hardening

By Wm. G. Slack

Syracuse Chapter—The March meeting was held at the Syracuse Industrial Club, which has been selected as a new meeting place.

Speaking on "Age Hardening Copper Alloys," H. L. Burghoff of Chase Brass & Copper Co., Inc., Waterbury, Conn., explained that many alloys of copper are hardenable by a precipitation process. Beginning with a short discussion of atomic arrangement, the speaker developed the theory of age hardening and mentioned many specific alloys which may be so treated.

Among the alloying elements which may be used with copper to produce a hardenable alloy, Mr. Burghoff mentioned beryllium, chromium, cobalt, titanium, iron plus phosphorus, nickel plus aluminum and nickel plus tin.

The properties of various compositions containing these alloying elements were graphically illustrated by slides.

Syracuse Chapter has not had many non-ferrous speakers in recent years, but from the interest aroused by Mr. Burghoff's talk, it has been recommended that more men from this field be invited. Mr. Burghoff did a fine job of explaining a subject which was relatively new to many Syracuse members.

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Waterhouse Speaks At Cincinnati Chapter

Cincinnati Chapter—National President Waterhouse covered some of the notable developments and spectacular changes in the iron and steel industry in Great Britain since the depression following the World War in his talk on "Recent Metallurgical Developments, Here and Abroad" presented at the meeting on Feb. 10.

Recent plant construction was described in some detail, supported by Dr. Waterhouse's knowledge and his observations while in Europe in the fall of 1936. These developments, according to Dr. Waterhouse, introduced many lessons for us as repercussions are being experienced all over the world, such as the "four year plan" in Germany.

Foundry practice and special cast irons were brought up as well as steel making, which are worthy of no little attention. Special references to the open-hearth and electric furnace practices proved most enlightening when discussed by Dr. Waterhouse. Rolling mills, alloy steels and heat treatment also demanded some attention.

This meeting was designated "Sustaining Members Night" and all sustaining companies were represented. Delegates of M.I.T. alumni were also present.

Boegehold Addresses 500 At Gala Cleveland Meeting

By H. D. Churchill

Cleveland Chapter—It was a gala night at the Cleveland Club Feb. 7 when the Cleveland Chapter A.S.M. and the Northeastern Ohio Chapter of the American Foundrymen's Association sat down, 225 strong, to the dinner which opened their joint meeting.

At the end of the dinner, Chairman Williams presented the speaker, A. L. Boegehold, head of the Metallurgical Department, Research Laboratories of General Motors Corp., to an audience of well over 500.

Mr. Boegehold's address was on "Alloy Cast Iron." Starting with the A.S.T.M. definition of an alloy iron, he proceeded to show what the effect of the various alloying elements was on the physical properties of the irons.

By means of numerous slides showing microstructures, diagrams and tables, Mr. Boegehold built a clear, instructive and interesting picture.

The success of the evening was so evident that it is hoped arrangements may be made for future meetings with the A.F.A.

New Smothered Arc Welding Process Described at Joint Meeting With A. W. S.

By James A. Smail

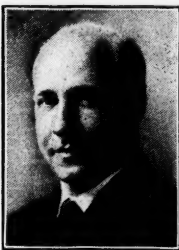
Mahoning Valley Chapter—At a joint meeting with the American Welding Society, Dr. Gilbert E. Doan, professor of metallurgy at Lehigh University, gave a very interesting talk on the methods of welding and their application in the industry.

The methods commonly used are electric resistance, electric fusion, gas fusion and spot welding. G. E. Doan Lantern slides helped materially in understanding the rapid progress being made in the welding art.

Particular attention was given to the new "smothered arc" process. This method welds 1-in. plate 40 times as fast as the manual arc process, leaving very little stress in the weld and little hardening of the parent metal.

Dr. Doan stated that the progress in welding application has been so rapid in the last ten years that it is now applied in making of pipe, joining of pipe, building construction, sea-going vessels, railroads, or, in fact, any place where two metals are to be joined together. Alloy steels, copper and copper alloys, aluminum, cast iron, and all grades of carbon steels can be welded.

A.S.M. Chairman Anthony opened the meeting and made a few introductory remarks. Mr. Watson of the Youngstown Welding Co. then introduced the speaker. He stated that the



G. E. Doan

Krivobok at Chicago Battles Microphone In Dynamic Lecture

Chicago Chapter—The meeting on Feb. 10 started with a bang with Charley Wilson of the Northwestern School of Crime Detection giving an interesting story on the technical phases of "thug tracking." Those who feel that the use of the microscope for metal study is somewhat limited were acquainted with the illuminating details of the science of crime detection and the very clever technique used in finding out who shot who and how!

The principal speaker, one Vsevolod Nicholas Krivobok, dynamic and colorful, presented a most interesting story on stainless steels. His roaming habits were somewhat handicapped by having to use a microphone, but his spirit was not daunted and he spent much enthusiasm in climbing the microphone stand and table.

All in all, the subject of stainless was well covered by a speaker of keen interest and knowledge of the subject. The specific environment phases of the subject and the need of greater care in selection of material to suit the application were strongly emphasized in the talk.

Marc Grossmann, who has been closely associated with Dr. Krivobok, introduced the speaker with inside dope on his boyhood days—from carriage to carriage—and thus made an opening that carried throughout the meeting. The exchange of witticisms was considered a draw, especially as it is an inducement for a return engagement.

And the chairman promises a button-hole microphone for the occasion—with an extra long cord to give the speaker his full freedom and not hamper that admirable fire he packs in his interesting talks!

welding processes are largely metallurgical and that the application of welding would be very much restricted if it had not been for the metallurgists' help in producing a sound, strong, ductile weld, equal in physical properties to the metals which are joined.

Control of Heat Is Most Important Factor in Forging

By C. E. Chapman

Calumet Chapter—At the regular monthly dinner meeting held at the Woodmar Country Club on March 8, Derk Dekker, chairman of the Educational Committee, briefly outlined the educational course to be sponsored by the Chapter starting March 18.

In the main event of the evening A. M. Steever, superintendent, Columbia Tool Steel Co., was featured in a talk on the "Manufacture of Steel Forgings."

Dating from the use of the early water-powered hammers, the history of forging equipment was traced down to the present day types, of 25,000 lb. falling weight.

Heating equipment and procedure were traced from the early coal-fired furnaces, which gave a heavy bark or decarburized skin, to the present-day controlled atmosphere furnaces, which yield a product practically free from decarburization.

The speaker felt that the absolute control of the heating processes is about the most important factor. Most of the steels have a wide application for precision tools of all classes and depend upon subsequent heat treatments for their ultimate properties.

Heating must be done so as not to cause checking. It must be slow enough so the temperature is uniform throughout and must be held within a commercial narrow range of temperature, which gives a desired balance between grain size and plasticity.

In closing, Mr. Steever said that the forging industry has contributed largely to the success of the automotive, the farm implement, tractor, railroad and machine building industries, to say nothing of adding to the national security, and therefore has a certain future of continued success.

A very lively and enlightening discussion followed Mr. Steever's address.

New Cementation Process Using Silicon Described

By F. D. Steinway

Milwaukee Chapter on Feb. 9 had the privilege of hearing the premiere disclosure of the details of a new process of impregnating ferrous metals with silicon, presented by Harry K. Ihrig, director of laboratories, Globe Steel Tubes Co.

This process is called "Ihrigizing" and consists of treating ferrous articles with crushed silicon carbide and dry chlorine in a rotary carburizing furnace. The process is described in detail by Dr. Ihrig in the April issue of METAL PROGRESS.

The coffee talk was presented by Harry Stuhldreher, football coach and athletic director of the University of Wisconsin. He pointed out that many spectators take the game too seriously when it is supposed to be a recreational activity. They are only too ready to criticize a player for an unsuccessful play, when he should be given credit for doing his best in trying to make speedy decisions while under severe physical and emotional strain.

Gleanings...

... from the chapters

Hosts and Guests

THE spring of the year seems to be the time for all good chapters to come to the aid of their fellow members and really put over some extensive and worth-while joint meetings.

Starting at State College, Pa., we have the Third Biennial Inter-Chapter Meeting of the Pittsburgh, Philadelphia, Lehigh Valley, York, Penn State and Southern Tier Chapters. This is a two-day affair on May 20 and 21, the subject of which is rumored to be "Machinability of Metals."

Boston plays host this year to the New England Regional Meeting also on May 20, when all New England Chapters will gather at Massachusetts Institute of Technology for a day of golf, technical papers, a banquet and entertainment.

April 25 is the date of the joint meeting of Rochester, Southern Tier and Syracuse at Cornell University—John Johnston is the speaker.

Then there is the annual Tri-Chapter meeting in Ohio with Columbus and Cincinnati Chapters visiting Dayton on April 27; subject—corrosion.

And Buffalo has invited its neighbor across the border in Ontario to come over on April 22 and join the local boys in a visit to the Lackawanna Plant of Bethlehem Steel Corp.

Pat on the Back

WE HOPE the friend who wrote the following in a recent letter will not object to being quoted. When all the members of a family agree, we think we have something. To wit:

"I joined the Schenectady Chapter of the A.S.M. during the past year, while I was a senior at the Rensselaer Polytechnic Institute, and have since learned to consider this organization as one of the most progressive of the technical societies. Both my father, who is a member of the Pittsburgh Chapter, and my brother—a member of the Penn State Chapter—second my nomination."

Education ala A. S. M.

WITH the season for educational courses rapidly drawing to a close, some interesting figures have been reported showing their unflinching but ever-surprising success.

For instance, Philadelphia gained 63 new members right after the start of the special evening course on "Metals at Your Service" last January. John Harsch of Leeds & Northrup Co. signed up 50 men at one time from his own organization alone—which is some sort of a record.

In Dayton, out of the 100 who turned out for the first lecture of the course, 37 were non-members, and membership immediately jumped.

Columbus Chapter, having never before sponsored any educational activities, tackled a course on heat treating with some misgivings. After the first meeting, however, writes D. E. Krause, the last traces of skepticism were completely dispelled.

Education in California

ALL this talk of educational activities brings us to Al Bates's perennially favorite course on Fundamentals of Ferrous Metallurgy which, when presented in Los Angeles during the Western Metal Congress, averaged an attendance of 450!

It seems that the Californians and other visitors to the Congress just ate up education of all sorts, not only in the lecture course but in technical sessions and in Exposition displays as well. Indeed the enthusiastic reception accorded this Metal Congress set a mark that future events are likely to have difficulty in matching!

Corrosion and Electricity Use Most Copper

Various Alloys and Their Applications Described by Freeman; Movie Gives History

By F. A. Pease

New Jersey Chapter—J. R. Freeman, Jr., assistant technical manager of the American Brass Co., Waterbury, Conn., presented a complete and interesting talk at the February meeting; preceding it were two motion pictures portraying the history of copper from mine to consumer.

The electrical industry is responsible for the consumption of approximately 50% of the copper production. A cadmium-copper alloy for trolley wire systems and a tin-copper alloy for drop wire purposes in telephone equipment are examples of the diversified uses of copper for electrical purposes.

Combating corrosion with copper and copper alloys in the architectural, automotive, marine, and sanitation fields accounts largely for the remainder of the copper consumption.

Copper Sheets for Building

Sheet copper, electrolytically produced, 50 in. wide by 0.00135 in. thick, weighing 1 oz. per sq. ft., is being used extensively in place of and in combination with building paper where its superior qualities of weather proofing, vermin resistance and minimum air infiltration make it the logical specification material.

Copper's sociability toward other metals makes alloying a comparatively easy matter. Although over 1000 alloys are known, a copper producer is normally required to handle about 300.

The copper-zinc alloys, properly termed the brasses, are extensively used over a wide range of compositions, according to the particular application.

For such applications as springs and diaphragms where high resiliency and resistance to fatigue and wear are required the phosphor bronzes are used.

Condenser Tube Alloy Developed

The corrosion of condenser tubes has long been a problem for the engineer on both land and sea. Muntz metal (60% Cu, 40% Zn), formerly used extensively, was superseded by Admiralty metal (70% Cu, 29% Zn, 1% Sn), the latter supplying approximately 70% of the demand.

The development of a 70% Cu, 30% Ni alloy has been accomplished and accepted as a superior tube alloy, particularly for marine service. In England an aluminum brass alloy is used extensively for salt water applications.

The development of the copper-silicon alloys in 1925 as a substitute for the tin bronzes is noteworthy because of their equivalent corrosion resistance to copper and increased strength, approaching that of ordinary steel. This material finds greatest application in welded hot water storage tanks, being particularly easy to weld. Its use in marine service is constantly increasing.

Copper-beryllium alloys are of interest principally because of their age-hardenability. Articles may be fabricated with comparative ease and then by selected heat treatment can attain unusual physical properties.

Beryllium additions are usually 1.6 to 2.75%. The addition of nickel is effective for grain size control.

Welding of copper alloys by resistance, seam, and spot methods is readily accomplished. High brasses are successfully welded by the oxy-acetylene torch. Copper-silicon alloys may be welded with either oxy-acetylene or electric methods.

Intimate Glimpses of A.S.M. Night Life



Marc Grossmann, Vsevolod Krivobok, and Walther Mathesius Insisted Upon Talking Over Steel Structures, Even at a Dinner Dance. Mrs. Archer and Mrs. Mathesius, however, seem to be enjoying it



Stokowski?—No, It's Janitzky!

"D'Arc" Foils Sunday Drivers in Time to Enlighten New Haven

By Don Sawtelle

New Haven Chapter turned out in record numbers on March 17, with good reason, as A. H. d'Arcambal, consulting metallurgist of Pratt Whitney Co. of Hartford, was the speaker of the evening, and the subject was "Factors Affecting Machinability."

"D'Arc," as he is better known by his host of friends in A.S.M. Chapters, got off to a rather delayed start, as the New Haven Sunday drivers ganged up on him to the extent of one fender, and one cracked lantern slide.

Following his discussion along, from types of tools, their heat treatment, types of materials to be machined, effects of grain size and special lubricants, everyone present was given a clearer view of the ever important subject of machinability.

Al Eplett of the Consolidated Ashcroft Co. was the technical chairman, and credit must also be given him for the orderly manner in which the meeting was conducted, especially during the question period.

The evening was only complete after a close-up examination of the many exhibits which were used to illustrate "Factors Affecting Machinability."

Closing Date for Papers

All members of the Society are cordially invited to submit technical papers to the Publication Committee for its consideration for presentation before the National Metal Congress in Detroit next fall.

Papers should be sent to the National Office in Cleveland to the attention of Ray T. Bayless, assistant secretary, American Society for Metals, not later than June 25, 1938.

Peculiarities of the Corroding Medium Must Be Considered

Speller Gives Example of Variations in Soil Corrosion; Some 40 Times as Active as Others

By George E. Stoll

At a joint meeting Feb. 9, 250 members of the Notre Dame Chapter of the A.S.M. and the St. Joseph Valley Section of the American Chemical Society gathered to hear Frank N. Speller of the National Tube Co. speak on "The Corrosion of Metals."

Metals are unstable forms of matter and tend to revert to the original form found in nature. Dr. Speller remarked that the surprising thing is not that metals corrode but rather that they don't corrode faster.

The common forms of corrosion may be classified under three general heads; namely, atmosphere, water, and soil. It is essential to know not only the class of corrosion to which a metal is to be exposed but also any idiosyncrasy of the medium.

As an example of this statement Dr. Speller related that the Bureau of Standards reports that corrosion in different soils with a given metal shows variations so great that the rate of attack in the most active soils is 40 times as great as in the least active.

In the selection of a metal or alloy for resistance to corrosion or other protective measures, there is always more than one possibility. The cost factor is often dominating and the best selection may not warrant the monetary outlay.

This has led to an abundant use of coatings, such as electroplated metals of higher corrosion resistance, galvanizing, special paints, and metal cladding. The problem is sometimes solved most economically by water treating, such as the use of sodium chromate in brine or cooling water.

Dr. Speller illustrated his lecture with slides showing the effect of changing some of the variables such as pH, oxygen content, velocity, colloids, metal film-forming constituents, on the durability of plain carbon steel, alloy steels, and other metals.

After the lecture Dr. Speller in a most interesting discussion related and illustrated some practical methods in use today for increasing corrosion resistance. Slides showed the inside coating of water conduits and the concrete and bituminous covering of pipe for use in corrosive soils.

Chicago Holds Valentine Party

Dinner, Entertainment, Dancing, Even Polo Provided for Guests

By David R. Howerton

The third annual informal Valentine Party of the Chicago Chapter was a dinner-dance, held Feb. 12 at the Medinah Athletic Club.

A social hour, beginning at seven, did much to remove the stiffness. Whether this was due to the warmth of good fellowship or possibly (but highly improbably) the spiritus frumenti contained in the punch bowls of unknown capacity, it would be difficult to say, since both were present in copious quantities.

Following the "hour of good fellowship," the Grand Ball Room was filled with over 200 couples (a matter of the survival of the fittest) seated four couples to each beautifully decorated table to be wined, dined and entertained.

A sumptuous eight-course turkey dinner—nutriment flavored and decorated fit for the gods (and goddesses)—was brought forth and served.

During dinner and for the remainder of the evening, music of either a sweet, slow, fast, swing, hot, smooth, waltz, fox-trot, or trucking nature was furnished by a twelve-piece orchestra, with Emil Janitzky pinch-hitting as conductor.

The climax of activity came shortly after dinner when the dance floor was cleared and the ringside filled in. The Master of Ceremonies hushed the noisy crowd and announced the play-off for the intra-chapter polo championship.

Immediately the playing field was filled with six players of every conceivable stature mounted ala kiddy kar. The polo ball was rolled on the floor and put into play. Immediately the polo ponies balked and for the next 20 min. they were the roughest, buckingest, hard ridingest broncos that ever appeared on a polo field. The game, although strongly protested, ended in a tie.

Dancing continued until the early hours of morning during which time the waltz, fox-trot, two-step, one-step, no steps, the polka, shag, etc., were all executed as well as steelmakers and steel treaters could be expected to perform, and then, wearily but happily, the party ended. May its memories linger on!



Compliments

To A. Allan Bates, manager of the chemical and metallurgical division, Westinghouse Electric & Mfg. Co., on the enthusiastic reception given his series of lectures on "Fundamentals of Ferrous Metallurgy" presented recently on the Pacific Coast.

To H. W. Gillett on his selection by the American Institute of Mining and Metallurgical Engineers to deliver the 1939 Howe Memorial Lecture.

To Cecil Henry Desch, superintendent of the National Physical Laboratory, England, on the award of the Bessemer Gold Medal for 1938 of the British Iron & Steel Institute.

To the various convention committees, the exhibitors, the authors of technical papers, to A.S.M. Secretary Bill Eisenman, exposition impresario par excellence, and to all connected in any way with the convention, on the unparalleled success of the Western Metal Congress in Los Angeles last month.

Here and There With A. S. M. Members

FROM the trade of tool maker to the presidency of a large manufacturing company may sound like a Horatio Alger success story, but it is rather the true career of Roy H. Smith, recently elected president of Lamson & Sessions Co.

The various steps in this career are represented by successive positions as tool maker in Rhode Island; designer of automatic machinery and then assistant superintendent of Russell, Burdall & Ward Bolt & Nut Co.; mechanical engineer, American Bridge Co.; chief draftsman, automatic machinery department, Waterbury-Farrell Foundry & Machine Co.; general superintendent, National Screw & Tack Co.; treasurer and general manager, Falls River Co.; executive vice-president, Lamson & Sessions Co.

With all this, Roy Smith also found time to graduate from Rhode Island School of Design and Brown University, to serve in the Ordnance Department during the War, and act as vice-mayor and mayor of the city of Kent, Ohio. He is at present treasurer of the Board of Trustees, Kent State University.



R. H. Smith

AMONG the important names in the steel casting industry is that of Roy A. Gezelius, appointed metallurgist, Taylor-Wharton Iron and Steel Co., High Bridge, N. J.

Particularly noteworthy has been work done at the Naval Research Laboratory, Washington, where Gezelius was formerly associate metallurgist, in collaboration with C. W. Briggs on contraction of cast steel during cooling. Other fields of research to which he has contributed include physical metallurgy, gamma ray radiography, and aging of iron and steel.

Educated at Michigan State College, Mr. Gezelius was recently accorded honorable mention by the American Foundrymen's Association for his work in the field of metallurgy.

British Institutes to Visit Metal Congress

An important group participating in the National Metal Congress to be held in Detroit, Oct. 17 to 21, will consist of representatives of the British Iron and Steel Institute and Institute of Metals.

The two British Institutes plan to hold their autumn meetings jointly in the form of a visit to the United States and Canada inspecting representative ferrous and non-ferrous metal works.

The tour is divided into four sections, as follows:

Section I—Sept. 17 to Oct. 2. Preliminary visit to Canada.

Section II—Oct. 2 to Oct. 5. Points of interest in and around New York.

Section III—Oct. 5 to Oct. 18. Trips to Washington, Pittsburgh, Cleveland, Detroit (including the National Metal Congress).

Section IV—Oct. 18 to Oct. 22 or Oct. 26. Return to New York with optional visits to Chicago, Buffalo or other cities.

The Autumn Lecture of the British Institute of Metals will be held in Detroit the evening of Oct. 17, opening day of the National Metal Congress. Members of both Institutes are invited to take part in the meetings of the American Society for Metals and the American Institute of Mining & Metallurgical Engineers.

ADD EQUIPMENT Co., First National Bank Bldg., Pittsburgh, has been appointed representative of GENERAL ALLOYS Co., Boston, in western Pennsylvania, West Virginia, Garrett and Alleghany Counties in Maryland, and the eastern counties of Ohio.

A. F. HOLDEN Co., New Haven, Conn., has announced the appointment of the JAMES H. KNAPP Co., Los Angeles, as its California representative.

Regional Meeting at Boston

The New England Regional Meeting of the New England Chapters of the Society will be an all-day meeting held at Boston on May 20.

Registration will be at 10:00 a.m. at Massachusetts Institute of Technology. The M.I.T. laboratories will be open for inspection and golf will be provided at local country clubs.

The technical session at 2:00 p.m. will feature papers by John Chipman and J. T. Norton.

At 6:00 p.m. a banquet will be held at Hotel Bradford. Principal speaker will be President Karl T. Compton of M.I.T. A.S.M. President Waterhouse and Secretary Eisenman will also be called upon for remarks. Entertainment by the Bradford Pent House Show will follow the speeches.

Bates Lectures Replace Regular Monthly Meeting

By C. W. Horack

Golden Gate Chapter—During March, the regular monthly meeting was omitted, and in its stead the Educational Committee, headed by William Moody, arranged for a series of lectures by Dr. A. Allan Bates, who needs no special introduction to the Society.

This series of five talks on the "Fundamentals of Ferrous Metallurgy" followed along the same lines of Dr. Bates's lectures at the Western Metal Congress in Los Angeles the following week.

Golden Gate Chapter members and their friends welcomed this opportunity to hear this excellent series of lectures. The many well placed, illustrative slides made the talks immensely interesting and instructive.

Considerable discussion followed each of the meetings. The average attendance was about 130.

Golden Gate Chapter appreciated Dr. Bates's visit; his interesting talks and pleasant personality will not soon be forgotten.

Reliability Is Rated Foremost Factor in Aircraft Materials

By J. Arthur Reese

Baltimore Chapter—"Aeronautic Materials" was the subject of G. D. Welty at the March meeting. Mr. Welty is automotive engineer of the Aluminum Co. of America, Cleveland.

In speaking of the requirements governing the selection of materials used in aircraft construction, Mr. Welty stressed reliability as the foremost consideration, with weight saving second and cost last. He pointed out that weight saving may be regarded as the key to advancement in aircraft performance, and showed how almost every improvement in fuel, design, and material may be evaluated in terms of reduced weight.

In engine construction approximately 50% of the weight is accounted for in alloys of aluminum and magnesium, 45% in steel, and only about 5% in other metals.

While aluminum is the dominant light metal used in engine construction today, there is a definite tendency toward the use of more and more magnesium because of the weight saving possibilities, and this trend the speaker felt will continue until aluminum is used only for those parts where high thermal conductivity is an essential requirement.

In discussing materials for aircraft propellers, Mr. Welty said that alloy steel must almost necessarily be used for major hub parts, while several different materials can be used for propeller blades.

Aluminum alloy propeller blades have proved highly satisfactory for all present day sizes but the necessity of reducing weight in larger sizes may require a lighter material or a different propeller blade design.

For the body of the plane and for wing covering, aluminum alloy sheets are given a corrosion resistant coating, either by anodizing or by rolling a thin layer of very pure aluminum on the surface. The sheets are joined by riveting, but Mr. Welty predicted, in concluding, that welding will replace riveting to a great extent as it already has done in steel construction.

New Wire Association Officers

At a recent meeting of the Wire Association's Board of Directors, the following officers were elected for the 1938 term: F. A. Westphal, president; John C. Callaghan, vice-president; E. W. Clark, vice-president; Richard E. Brown, secretary-treasurer.

Speaker Kinzel in Action at Chicago



Dr. A. B. (Gus) Kinzel as He Appeared at Work on Questions From the Floor at the Chicago Chapter Meeting on Mar. 10. Dr. Kinzel's subject was "Specific Effect of Alloying Additions in Steel Making." R. S. (Bob) Archer (left), A.S.M. past president, was technical chairman

Practical Heat Treating Lures Large Audience

Problems Resolve Into Attempt to Retain Size and Shape in Quenching Says Bach

By L. Geerts

Boston Chapter met March 4 at M. I. T. The speaker, A. Dudley Bach, president, New England Metallurgical Corp., South Boston, has long been active in Boston Chapter affairs. He was a member of the Executive Committee for several years, and Chairman in 1931-1932.

His topic, "Practical Heat Treatment," lured an unusually large and enthusiastic audience, proving again how close to the heart of the average member are the down-to-earth heat treating problems.

The many problems that confront the average hardener, according to Mr. Bach, resolve themselves into the attempt to bring the parts out of the furnace, or out of the quenching bath, the same size and shape as when they went in.

Movies Illustrate Problems

This problem cannot entirely be solved, but by careful and proper selection of steel, the troubles from distortion and other sources can be minimized.

These problems and their solutions were vividly brought out by the use of about 1400 ft. of movie film taken at the plant of the New England Metallurgical Corp.

Starting with nitriding, the film showed the actual loading and unloading of a furnace as well as many different types of shafts, molds, etc., that are ideal for nitriding application. It also showed some nitralloy parts that were defective due to decarburized steel.

The hardening of a large high speed cutter was followed by the hardening and straightening of a 6-ft. water hardening tool steel broach.

During the entire film Mr. Bach was able to make running comments, pointing out faulty selection and application of steel, method of straightening, and other details.

Pictures of miscellaneous heat treatments ranged from carburized shafts with a very deep keyway to heat treating alloy steels, pack hardening bakelite molds and close-ups of the variety of parts hardened in a commercial heat treating plant.

Color Close-Ups Are Striking

Another section of the film was devoted to carburizing and hardening of various long shafts. The importance of using fine-grained steels for such applications was dramatically brought out.

Next the entire cycle of carburizing and hardening large sleeves weighing up to 7000 lb. and made of S.A.E. 4615 was shown, and the picture was finally terminated by a striking series of close-ups in color of the heat treating of large stainless steel welded tanks.

This excellent presentation induced bursts of spontaneous applause, and at its conclusion there was wide participation in the general discussion, which lasted well into the evening.

The coffee talk was presented by Col. Percy A. Guthrie, whose tale of adventure furnished flavor for the later technical session.

A committee report was made on the splendid program being planned for the Regional Meeting May 20. The Boston Chapter as host gives an unqualified promise to make this affair well worth attending.

Lord Intended Tin for Use in Bearings Bierbaum Convinces Rhode Islanders

By Walter M. Saunders, Jr.

Rhode Island Chapter—"When the Lord made tin, he did so with the idea of its use in bearings." This was the firm conviction of Christopher H. Bierbaum, vice-president of the Lumen Bearing Co., Buffalo, who addressed the Chapter on March 2 on "Bearings—Their Design, Material, and Lubrication" and illustrated his talk with many excellent slides.

With 40 years experience in this field, Mr. Bierbaum has come to the conclusion that there is still a great deal to know about bearings, but many facts have been learned and cannot be disregarded in correct applications. He was firmly convinced that there is no universal bearing metal and that destructive testing of bearings in the laboratory is the utmost folly, the only safe method being a service test.

Requirements for Good Bearings

It is generally accepted that a good bearing metal must be an alloy consisting of hard crystals in a soft matrix, and one that can retain a lubricant on a run in service. Dissimilar materials, one homogeneous and the other heterogeneous, make the best type of bearing—for instance, a properly hardened steel and a bronze.

The hard constituents must not loosen from the softer matrix of a bearing metal, as they do in cast iron, and the composition as well as the microstructure determines the proportion of hard constituent present. The hard constituent must not be changed from the proper amount by improper heat treatment.

The metal must be properly cooled when cast. Too slow cooling results in a coarse structure, which is brittle, and too rapid cooling causes a structure not heterogeneous enough for good results.

Mr. Bierbaum stated that perfect run-in bearings can be made in the shop by proper tooling. In this connection he believes a diamond tool is ideal, and protested against the multiple edge reamer.

Oil Corrosion Causes Trouble

Photographs illustrated the appearance of the surface of a bearing tooled with such a reamer in comparison with the single blade reamer, and showed that there was little, if any, abrasion of the surface with the single blade reamer. The multiple edge reamer grooved the bearing metal considerably,

with fragmentation of the hard constituents.

The high lead bronzes are of interest to Mr. Bierbaum, chiefly because high lead permits poor workmanship, and can be used where lubrication is poor.

There is no substitute for tin, except where the cost is a matter of great concern. Powder bearings are good in secondary applications only.

Corrosion of bronzes used as bearing metals by oxidized oils is a source of considerable trouble. Mineral oils with 2% oleic acid are excellent lubricants, but corrosion is excessive. Anhydrous greases give no trouble, but in the presence of water can cause corrosion, the alkali in the grease being responsible.

By micro-hardness tests in worm and gear applications, Mr. Bierbaum showed that nitrided nitralloy is superior to carburized S.A.E. steels 2515, 6115, and 4615, because of the uniform micro-hardness of nitralloy. The case carburized steels sometimes cause excessive wear due to spalling of the case.

There are three types of bearing lubrication: First, flooded lubrication, which is the ideal; second, adsorbed lubrication, where a film of oriented molecules is present on a bearing surface; and third, boundary lubrication, with metal to metal contact, which is very poor.

Contrary to some work that has been done, the best position of an oil groove is in the arc of minimum pressure which is 20 to 60° from the vertical at the top of the bearing.

This meeting was the annual non-ferrous meeting of the year, and will long be remembered because of Mr. Bierbaum's wealth of experience, and excellent presentation of his subject.

New Permalloys Developed For Magnetic Applications Described by G. W. Elmen

By J. Z. Briggs

New York Chapter—An extended hunting trip in Mexico was the subject of an entertaining dinner talk illustrated with moving pictures given by S. Blickman at the February meeting.

Vice-Chairman J. S. Marsh was technical chairman for the talk by G. W. Elmen of the Bell Telephone Laboratories on "Development of Alloys for Magnetic Applications."

The need for an alloy with high permeability, low hysteresis loss, and high resistivity in the electrical communication system led to a complete investigation of the iron-nickel-cobalt alloys, with particular emphasis on the effect of heat treatment on their magnetic properties.

Among the new alloys developed were 78.5 Permalloy (78.5% Ni, 21.5% Fe) and 45 Permalloy (45% Ni, 55% Fe), both having very high magnetic permeability; Permendur (50% Co, 50% Fe) which has a high permeability at higher flux densities than any other known material; and Perminvar (45% Ni, 25% Co, 30% Fe) characterized by constant permeability over a wide range of flux densities.

Two additional Permalloys combining high permeability and high resistivity were also developed by the addition of about 4% Mo or 4% Cr to the 78.5 Permalloy. Some of these new alloys require special heat treatments.

This extensive investigation has resulted in large economies and improvements in electrical communication systems; for example, a telegraph cable will transmit in a given time

Sauveur Honored



Chairman Stoeckle Presents a Scroll to Dr. Sauveur Commemorating Philadelphia Chapter's Fifth Annual Sauveur Night

Production Figures Show Extensive Use Of Copper and Alloys

By C. W. Horack

Golden Gate Chapter—Through the courtesy of A. W. Gruss, agent for the American Brass Co., a short movie on skiing, featuring the Olympic contestants of 1937, was shown as a preliminary feature of the February meeting. This was quite entertaining and proved an interesting diversion to all present.

The principal talk of the evening was given by G. P. Spilsbury, sales development engineer for the American Brass Co., on "Copper and Its Alloys."

The speaker covered the subject in considerable detail from mine to finished product. The extensive use of copper was forcibly brought out by a review of recent production figures.

Due to the low grade of the average American copper ores, complex operations are required to produce a marketable wire bar or billet; to do so in the face of low copper prices of recent years must be considered a tribute to American engineers.

Following through the various operations necessary to produce a billet, the speaker traced the final flow of the refined copper into the principal industries.

In discussing the diversity of products made of copper and its alloys, the speaker mentioned that in one large plant alone many thousands of different products are being made. The physical requirements of many of these products were said to demand variations not greater than 0.01% of an element entering into the composition of some alloys.

The mark-up for copper products over base copper prices was said to be due chiefly to the cost of precision work, small quantity units with close physical and chemical control.

The speaker's remarks were further amplified by a fine display of various copper products. It was the general consensus that Mr. Spilsbury gave an excellent discussion of the present-day status and use of copper and its alloys. Five times as many messages with Permalloy loading as without. The size of telephone loading coils has been reduced to less than one-tenth by the adoption of Permalloy powder cores.

Professor Speaks on "Things We Do Not Know About Steel"

Urges Confession of Ignorance and Verification by Laboratory Experiment

By M. M. Kennedy

Philadelphia Chapter's Fifth Annual Sauveur Night and Sustaining Members' Night was held on Feb. 5 at the Bankers and Manufacturers Club.

At the dinner preceding the meeting, the chairman introduced each sustaining member, arrangements having been previously made to seat these members at the speakers' table.

A brief talk on "Work and Wages" by Prof. C. Canby Balderson of the Wharton School of Finance, University of Pennsylvania, was followed by a piano duo.

Previous to the introduction of the principal speaker, National President George B. Waterhouse spoke of the Western Metal Congress and reviewed the healthy condition of the National Society.

The technical paper for the evening was given by Dr. Albert Sauveur himself. His subject was "Things We Do Not Know About Steel." He was introduced by Dr. Boynton, who studied and taught under Dr. Sauveur, who has been professor of metallurgy at Harvard University for many years.

The talk was based on a frank consideration of the gains to be had from talking about things we should know but don't. He stated that ignorance should not be considered a source of humiliation, and that the real scientist never hesitates to confess ignorance.

The Professor then proceeded to the allotropy of iron, asking how accurate is our knowledge of that phenomenon which plays so important a part in the treatment and properties of steel.

After discussing the various cross-currents in the stream of metallurgical thought, he concluded with a plea that we be cautious in our acceptance of hypotheses, the accuracy of which cannot be verified by laboratory experiments.

Dr. E. C. Bain, past national president, presented a discussion of Dr. Sauveur's paper.

At the close of the meeting, the Chapter presented Dr. Sauveur with a scroll commemorating the occasion, and expressing the Chapter's sincere appreciation of the speaker's endeavors, and their well wishes for his future.

Three Factors Named for Successful Heat Treatment

By R. J. Haigis

Hartford Chapter—"Heat Treatment" was the topic for discussion on March 8 when Harry L. Day, metallurgist of the Ingersoll-Rand Co., addressed approximately 200 members and guests.

Mr. Day first described the tremendous increase in knowledge which has developed within the past 15 or 20 years on heat treatment and steel.

The successful production heat treatment of precision tools and parts is dependent on three factors: First, knowledge of the raw materials; second, knowledge of the basic principles of physical metallurgy; third, knowledge of the equipment.

Mr. Day then elaborated on each of these principles, showing how, in his own plant, they are consistently able to produce tools and parts of very exacting requirements by a careful application to the above three principles.

Mr. Day concluded his talk with a movie showing the procedure followed in determining PF tests on tool steel.

Free Literature — Mail Coupon Below

Welding Electrodes

Smootharc Electrodes for every type of work are described in this booklet by the Harnischfeger Corporation. Points out advantages and particular applications of different electrodes. Bulletin Db-171.

"Who Owns NEP?"

Illustration of the much-discussed puppy, "NEP," goodwill ambassador of "NEP," the inhibitor, is being offered by the owner of both, the William M. Parkin Co., Pittsburgh, Pa. If you want a free picture of this great little dog, just check Bulletin Db-193.

Heat

This 48-page book published by Johns-Manville describes "the dramatic story of man's age-old struggle to control Nature's most powerful force." "Heat" makes easy and interesting reading. Bulletin Db-100.

Panphot Microscope

A universal microscope with photomicrographic reflex camera is explained in this well-illustrated booklet by E. Leitz, Inc. Points out applications and advantages of this system. Bulletin Db-47.

Proving Rings

An outstanding feature of the new Olsen Proving Rings is an electrically vibrated rod. Other popular features of Olsen Proving Rings are set forth in a new booklet published by the Tinius Olsen Testing Machine Company. Bulletin Db-147.

Lectromelt Furnaces

The story behind lectromelt furnaces is well told in this 48-page booklet issued by the Pittsburgh Lectromelt Furnace Corporation. Tells of development of this type furnace and describes recent improvements. Bulletin Db-18.

Shear Knife

A handbook describing the development of the solid steel shear knife by Sam Heppenstall, founder of the Heppenstall Company. Compact, bound in imitation leather, this booklet contains valuable data in the form of a hardness conversion table and shear knife performance charts. Bulletin Db-122.

Correct Alloys

A four-page folder pointing out the importance of correctly designed metallurgical alloys which fit the needs of product and process has been published by the Titanium Alloy Manufacturing Co. Also points out the importance of the spectrograph. Bulletin Db-90.

Vertical Carburizer

The Hevi Duty electric vertical retort carburizer is particularly applicable to intricate parts and selective carburization, where distortion must be held to a minimum. It is described in Bulletin My-44.

Enduro 18-8 Types

Detailed data on Enduro 18-8 and its several variations are featured in a 24-page book by Republic Steel Corp. which is radically different in layout, photography, and typographical treatment. Bulletin Dy-8.

Oxygen Lance

An eight-page booklet, profusely illustrated with diagrams and pictures, puts into convenient form much valuable information on the oxygen lance, which will be especially useful to anyone working with heavy sections of metal. The Linde Air Products Co. Bulletin Ba-63.

Pyrometer Drive Unit

For installations where their potentiometer control pyrometers are to be used singly, the Foxboro Co. has developed an improved type of motor drive unit. A new bulletin describes this unit and gives complete details regarding Foxboro potentiometer controllers. Bulletin Ox-21.

Binocular Mike

Extremely wide field, long working distance, and stereoscopic vision are only a few of the advantages cited by Bausch & Lomb for the improved KW wide field binocular microscope. Price list and description of accessories included. Bulletin La-35.

Hi Speed Hardening

New and interesting booklet describing the new Holden Ceramic Pot method of high speed steel hardening for either moly or tungsten high speed steels. Booklet gives complete story of this new development. Bulletin Na-55.

Salt Bath

"Heating from the inside out" is what makes the Ajax-Hultgren salt bath furnace practical. Ajax Electric Co. explains this new operating principle in an interesting folder. Bulletin Oy-43.

Steel Service

"Steel Service" is the title of a bulletin which gives valuable information on testing methods and pickling control charts. It is distributed by the Grasselli Chemicals Department of E. I. du Pont de Nemours & Co. Bulletin Aa-95.

The Review

7016 Euclid Ave., Cleveland

Please have sent to me without charge or obligation the following literature. Circle the numbers that interest you. It is important to write in your company or business connection when you return this coupon. (Please print.)

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Steel Shafting

Bliss & Laughlin has an attractive folder on their steel shafting, turned, drawn, ground, and polished to precision standards. Sizes and tolerances and uses are given. Bulletin Ax-42.

Galvanizing

An informative, historical, simple digest of galvanizing forms a guide to longer life for iron and steel products. This handsome, handy, 24-page book beautifully printed in color is distributed by American Hot Dip Galvanizers Association, Inc. Bulletin Ea-167.

Metals for Corrosion

Fourteen varieties of Midvalley corrosion and heat resisting metals are described in a detailed bulletin by The Midvale Co. Properties and applications are listed and illustrated. Bulletin Ca-160.

Cr-Ni-Mo Steels

A. Finkl & Sons' new catalog is really a technical treatise on chromium-nickel-molybdenum steels for forgings. Pocket size, 104 pages, cloth bound, illustrated by photographs, charts and tables. Bulletin La-23.

Everdur

Properties, applications and forms available of this copper-silicon-manganese alloy are described by American Brass Co. High strength and corrosion resistance, ductility, weldability, workability, and moderate price are some of the advantages featured. Bulletin Dc-89.

Vanadium Castings

A new 24-page bulletin well illustrated with more than 20 photographs contains a complete description of the properties and applications of a number of vanadium alloy steels for castings where high strength is required without excessive weight or high cost. Vanadium Corp. of America. Bulletin La-27.

Ampeco Metal

The six grades of Ampeco metal, varying in hardness and physical properties but all possessing wear resistance, tensile strength and corrosion resistance, are described in a booklet which also lists its uses in modern industry. Bulletin Ka-175.

Wire Belts

An 8-page folder on Monel metal woven wire conveyor belts lists the advantages of Monel metal, illustrates some typical installations, and describes the various belt constructions that are available. Cambridge Wire Cloth Co. Bulletin Bb-178.

Arcos Electrodes

An unusual technical bulletin describing the arc welding of stainless steel industrial equipment has just been published by the Arcos Corporation, Philadelphia. Bulletin Db-191.

Resistance Wire

A complete catalog of the various types of electric resistance wires made by Hoskins Mfg. Co. has been issued. Complete numerical data are included on all types, along with some fundamental facts about heating units. A handy, small size 48-page booklet. Bulletin Jy-24.

Furnace Headquarters

American Gas Furnace Co., headquarters for 50 years of heat treating furnaces and machines, for efficiency, economy, and production, has issued a general catalog describing various types of equipment and their operation. Bulletin Bb-11.

Cr Cast Iron

The excellent qualities of 1% chromium cast iron are indicated in a folder by Electro Metallurgical Co., showing physical properties and listing the applications for which various compositions of this material have been used successfully. Bulletin Bb-16.

Tempering

Vertical batch type tempering furnaces are described in a folder by Industrial Heating Equipment Co. Capacity and production figures and a diagram of the furnace are included along with a complete description. Bulletin Ia-168.

Metal Hydrides

Reprints of articles by Dr. P. P. Alexander on "The Hydride Process" discuss history, production and the uses of metal hydrides. Metal Hydrides, Inc., Clifton, Mass. Bulletin Db-190.

Recuperators

Results obtained with Carborundum Company's recuperators using Carbofrax tubes are fuel savings, closer temperature control, faster heating, and improved furnace atmosphere. Complete engineering data are given in Bulletin Fx-57.

Mo-W High Speed

J. V. Emmons, metallurgist for Cleveland Twist Drill Co. and largely responsible for the development of the molybdenum-tungsten high speed steels known as Mo-Max, has prepared a general description of these new steels. Bulletin Ka-103.

Stainless Slide Chart

Carpenter Steel Co.'s pocket-size slide chart gives at a glance the technical data on all stainless steels. Bulletin Jy-12.

Pure Metals

Pure, carbide-free metals are described and applications suggested in a pamphlet published by Metal & Thermit Corp., who make pure tungsten, chromium and manganese in addition to the ferro-alloys. Bulletin Ma-64.

Hardener's Pal

J. Milton Luers, Detroit, Mich., has just perfected the 'Ste-Tre-Meter', an accurate timer for steel treatment. It's an invaluable aid to the steel treater and will save thousands of dollars in eliminating burnt or soft steel. Write for attractive folder giving full details. Bulletin Db-194.

Hand Tools

The use of nickel alloy steels for hand tools and small power tools is described in a 15-page technical bulletin by International Nickel Co. Curves and tables show compactly the properties of the various alloys. Bulletin Cb-45.

Heat Resisting

A striking booklet by Drivers-Harris Co. has some interesting information and photographs of heat resisting alloys for heat resisting applications. The company makes a wide variety of parts from Nichrome, Chromax and Cinet. Bulletin Cb-19.

Insulating Brick

The important advantages of Insulbrick, made by Quigley Co., are fuel, time and labor saving, increased production, higher efficiencies, and lower operating costs. How these advantages operate is told in Bulletin Cb-139.

Rockwell Tester

A revised and completely up-to-date catalog on the well-known Rockwell hardness tester is well illustrated and contains 24 pages. Published by Wilson Mechanical Instrument Co., Inc. Bulletin Ca-22.

Heat Resisting Alloys

Authoritative information on alloy castings, especially the chromium-nickel and straight chromium alloys manufactured by General Alloys Co. to resist corrosion and high temperatures, is contained in Bulletin D-17.

Moly Cast Iron

The use of molybdenum in foundry practice, both on steel and cast iron, is described in a handsome booklet by Climax Molybdenum Co., which presents accurate technical information in a striking and modern manner. Bulletin Jy-4.

Explosion Protection

A gas burner safety device designed to prevent explosion made by Wheelco Instruments Co. is known as the Flame-otrol. Illustrations, data, operating diagrams and prices are fully covered in Bulletin Ia-110.

Riveting Aluminum

The riveting of aluminum and its alloys is treated from all angles in a comprehensive little booklet by the Aluminum Co. of America. Materials, types, riveting practice for various applications, and properties of the riveted joint are covered. Bulletin Da-54.

Turbo-Compressors

Spencer Turbine Co. has turbo-compressors in all sizes and types for oil and gas-fired furnaces, ovens and foundry cupolas. Special types for special purposes such as gas-tight and corrosion resisting applications are also described in Bulletin Da-70.

Bright Annealing

Electric Furnace Co. tells about their controlled atmosphere furnaces for continuous de-oxidized annealing, bright normalizing and annealing ferrous and non-ferrous metals. Work comes clean, bright and dry from these furnaces. Bulletin No-30.

Vapocarb-Hump

Vapocarb-Hump, the triple-control method for heat treatment of steel, is described in a 36-page catalog issued by Leeds & Northrup Co., in which a special effort has been made to show how this method gives complete control of tool surface, shape and structure. Bulletin Cb-46.

Welding Instructions

Primarily concerned with methods of showing welding on drawings by the American Welding Society's new symbol system, an attractively bound 81-page booklet entitled "Welding Instructions and Standards, Part I" has been published by the United States Steel Corp. Subsidiaries. Bulletin Cb-79.

Potentiometer Type

Potentiometer type pyrometers, indicating, recording and controlling, are catalogued in a 48-page booklet by Brown Instrument Co., well printed in three colors. Includes the new Electro-Line controllers and the Brown proportioning control system. Bulletin La-3.

Tubulaire

A new method of electric heating which combines circulation, greater radiating surface, and great strength is embodied in tubular resistor elements. Description, specifications and illustrations for the type made by Lindberg Engineering Co. are contained in Bulletin Cb-66.

Hard Facts

A new four-page monthly is being published by Wilcox-Rich Division of Eaton Mfg. Co. to tell you how Wilcox-Rich products are serving industry. Many articles and interesting data on the hard surfacing material, Xaloy, are contained. Bulletin Bb-188.

Cleaning Processes

An attractive 12-page booklet entitled "Scientific Metal Cleaning" has been published by Detroit Rex Products Co. It describes in detail the applications and advantages of Detrex degreasing with Perm-A-Clor or Triad Safety Solvents and the applications of Triad Alkali Cleaning Compounds and Strippers. Bulletin Oy-111.

Heroult Furnace

Revised and expanded to include modern major innovations in the construction and operation of the Heroult electric furnace, a new edition of the American Bridge Co.'s Heroult Electric Furnace Bulletin is now ready for distribution. Bulletin Bb-124.

Duronze

An 80-page technical handbook covering the physical properties and applications of four high strength silicon bronzes pioneered by Bridgeport and sold under the trade name "Duronze alloys" has been released by the Bridgeport Brass Co. Bulletin Bb-163.

Seamless Tubes

Just prepared by the Timken Steel and Tube Division of the Timken Roller Bearing Co. is a "Guide for Users of High Temperature Steels," which presents technical data relating to the various properties of Timken seamless tubes. Bulletin Bb-71.

Pipe and Tubes

Handbook and price list containing practical and technical information on Misco "Centricast" pipe and tubing (stainless, corrosion and heat resisting) is available from Michigan Steel Casting Co. Bulletin Bb-84.

Abrasive Cleaning

Comprehensive information on airless abrasive metal cleaning is contained in a new booklet on the "Wheelabrator" Tum-Blast, a patented mechanical device made by the American Foundry Equipment Co. Bulletin Fa-112.

Rotoblast

A new blast cleaning machine eliminates the need for compressed air as the abrasive driving agent. Pangborn Corporation tells how a rapidly spinning wheel propels the abrasive by controlled centrifugal force. Bulletin Ox-68.

Heat Treat Chart

Heat treaters everywhere should find a heat treating wall chart complete with S.A.E. specifications a very valuable addition to their shops. Published by Chicago Flexible Shaft Co., manufacturers of Stewart industrial furnaces. Bulletin Ka-49.

Certified Steels

Ryerson certified steels are the result of many years spent developing new specifications, new methods of control and complete readjustment of stocks. An interesting book by Joseph T. Ryerson & Son, Inc., tells the complete story. Bulletin Ab-106.

Ni-Cr Castings

Compositions, properties, and uses of the high nickel-chromium castings made by The Electro Alloys Co. for heat, corrosion and abrasion resistance are concisely stated in a handy illustrated booklet. Bulletin Fx-32.

Carbottom Furnaces

Operating data, illustrations, interesting text, are featured in the folder by Surface Combustion Corp. on carbottom furnaces for general heat treating purposes. Bulletin Bb-51.

Laboratory Service

A new edition of "The Metal Analyst" tells about an organization established by Adolph I. Buehler specializing in the installation of metallurgical laboratories. The complete line of laboratory equipment marketed by Buehler is also catalogued. Bulletin Dy-135.

Oil at Its Best

A booklet of generally useful information to metal working concerns using soluble cutting oil is offered by D. A. Stuart Oil Co., Ltd. The data should be of value in increasing soluble oil efficiency and consequent plant economy. Bulletin La-118.

Scleroscopes

Shore Instrument & Mfg. Co. describes its Model D standard recording scleroscope in a recent bulletin which explains the theory and practice of hardness testing with this machine. Bulletin S-33.

Newer Tool Steels

Vulcan Crucible Steel Co. has a complete and attractive catalog listing their full line of tool steels including many special types to meet the modern trends in industry. Bulletin Jy-127.

Ingot Production

"The Ingot Phase of Steel Production" is the title of a book defining the principles of quality ingot production followed by many well-known steel manufacturers. Gathmann Engineering Co. Bulletin Ka-13.

Pictorial Story

A pictorial and descriptive story of the manufacture of steel products by The Youngstown Sheet and Tube Co. is in reality a textbook of basic steel information contained in a 115-page, leather-covered, pocket size ring binder. Bulletin La-93.

Stainless Data Book

All users of stainless and heat resisting alloys should find invaluable the information contained in a booklet published by Maurath, Inc., giving complete analyses of the alloys produced by the different manufacturers, along with the proper electrodes for welding each of them. Bulletin Jy-125.

Dolomite Refractories

The case of Clinkered vs. Calcined Dolomite in the basic openhearth steel is set forth interestingly in a new pamphlet by Basic Dolomite, Inc., Cleveland, O. Bulletin Db-192.

Electric Salt Baths

Literature is available from Bellis Heat Treating Co. describing electrically heated bath furnaces which are economical to operate and have a wide range of applications in hardening, annealing and heat treatment of high speed steel, stainless steel, nickel, aluminum, copper and bronze, etc. Bulletin Ny-48.

Electronic Control

Exactly how the electronic principle is used to insure exact automatic control of furnace temperature is told and full data given on the "Alnor" pyrometer controller made by Illinois Testing Laboratories, Inc. Bulletin La-180.



The Junior Members' Own Page



Stainless Steels and Hardenability

(Extract from a paper for the Western Metal Congress entitled "Fabrication and Uses of the Hardenable Stainless Steels Containing From 0 to 15% Chromium")

By Bradley Stoughton
Dean, College of Engineering
Lehigh University

What Makes Steel Hardenable?

IF A STEEL, when heated above the critical range, is a solid solution of gamma iron containing an adequate amount of carbon, and, if this solid solution be cooled faster than the so-called "critical cooling rate," it will harden by the formation of martensite. To illustrate: A plain carbon steel having about 0.10% of carbon will, on slow cooling, have a pearlitic structure and a Brinell hardness of less than 100; on rapid cooling it will have a Brinell hardness of about 150. If the plain carbon steel contains 0.35% carbon, it will have a Brinell hardness of about 150 in the pearlitic condition and about 400 in the martensitic state. Even this 400 Brinell would scarcely bring it to the "hardenable" grade.

Chromium intensifies the hardening effect of carbon, so that steel containing 5% of chromium and as little as 0.12% of carbon will be considerably harder in the martensitic than in the pearlitic condition. It will be martensitic even if cooled from above the critical range in air. It will be pearlitic only when cooled very slowly in the furnace.

With more than 5% of chromium, it takes correspondingly less carbon to make a hardening steel, until we reach about 13% chromium, when a new condition arises, as follows: Chromium has a greater affinity for carbon than has iron. Therefore, as the mass action of iron becomes less and less, the carbon begins to form a chromium carbide instead of an iron carbide. This chromium carbide does not readily go into solution, with the result that we do not get an adequate amount of carbon in solid solution in the alloy above the critical temperature range, and, therefore, on cooling we do not get a full martensitic structure.

This non-hardening condition prevails when we have more than 16% chromium and less than 0.30 to 0.80% carbon. The more the chromium, the more the carbon necessary to produce a martensitic structure.

In confirmation of this theory, we may say that other elements having a higher affinity for carbon than has iron will effect the same result. For example, if we take the 4 to 6% chromium steels which are air hardening (that is to say, they will become martensitic

when cooled from above the critical temperature even in still air), and to these steels we add titanium to the extent of five to eight times the percentage of carbon present, these steels will become non-hardenable.

In other words, titanium carbide forms instead of part or all of the

changes to a body-centered cubic lattice on warming ("tempering") to 100°C. This theory would call for all the iron of the martensite to be in the body-centered condition, and the circumstance that quenched steel is less magnetic than the same steel annealed is explained on the assumption that some austenite remains untransformed to martensite.

The second theory is that martensite is a super-saturated solid solution, but that the carbon is not all in solution; some of it is precipitated in submicroscopic particles of iron carbide, pre-

Announcing a New Department—

QUIZ QUESTIONS

Small Prize Adds to Fun!

PREPARING A QUIZ is often far more difficult than answering the questions. True-false brain teasers are particularly difficult to think up and particularly challenging to the inquiring mind that tries to answer them.

THE REVIEW will therefore offer a prize of \$5.00 for the most original and appropriate set of ten metallurgical brain teasers with correct answers submitted before Friday, May 6. Here are two typical examples:

1. One of the following was a few months ago elected president of United States Steel Corp.

Myron C. Taylor

W. A. Irwin

BENJAMIN F. FAIRLESS

Edward R. Stettinius, Jr.

John L. Lewis

William H. Eisenman

2. Taylor and White's essential invention concerning tool steel was that tungsten, if enough was present, made a tool which was "self-hardening."

THAT THE TOOL SHOULD BE OVERHEATED BEFORE QUENCHING FAR BEYOND THE SAFE TEMPERATURE FOR A CARBON STEEL TOOL.

That the tool should be quenched and tempered simultaneously in a lead bath.

That the machine tools available at the time did not have enough power to develop the capabilities of the standard tools.

There is no qualification for this contest other than membership in the Society. No entries will be returned. Closing date is May 6. Send your QUIZ QUESTIONS immediately to THE REVIEW, American Society for Metals, 7016 Euclid Ave., Cleveland, Ohio.

iron carbide and therefore the steels do not become martensitic. The element columbium will have, in this respect, an effect similar to that of titanium.

What Is Martensite?

There have been several theories advanced to explain the nature of martensite, and the two which have the greatest support at the present time both define martensite as a super-saturated solid solution of carbon in alpha iron.

The first of these theories limits the statement to this super-saturated condition and explains the hardness of martensite on the basis of its small grain size; the hardness of the metastable super-saturated solid solution and the accompanying condition of internal strain due to distorted space lattice. With more than 0.60% of carbon, the freshly quenched martensite has a body-centered tetragonal lattice which

venting yielding along slip planes and therefore producing strength and hardness. This is called "precipitation hardness."

Why High Chromium Steels Are Not Hardenable

Chromium carbide does not dissolve readily in gamma iron; therefore steels containing more than 15% chromium and less than 0.20% carbon will be partly or wholly in the "ferritic" condition whether cooled rapidly or slowly, because much of their structure never has been austenitic and cannot be transformed into martensite. They are, in fact, composed of body-centered iron with the negligible, but normal, amount of carbon dissolved in it, plus separated carbides.

Carbides in particles larger than submicroscopic size do not produce the hardness and strength which are characteristic of either ferrous or non-ferrous alloys having hard particles of submicroscopic size uniformly and profusely distributed.

Upon freezing, these ferritic alloys consist of a solid solution of delta iron containing chromium and less than 0.20% carbon. If they cool very slowly to atmospheric temperature, the delta iron changes its name to alpha, but there is no phase change, because both are body-centered. Gamma iron never forms because of the deterrent effect of chromium atoms in the space lattice. Therefore the ferritic alloys are not hardenable.

Chromium alloys containing more than 0.30% carbon can be produced in the martensitic condition, because iron carbide opposes the effect of chromium and promotes the formation of gamma iron. A subdivision of the chromium alloys, according to E. C. Bain, summarizing these facts is shown at left.

There is another class of stainless

M.I.T. Offers Summer Program on Strength of Materials, Metal Structure

A special summer program and conferences on "Strength of Materials" will be held at the Massachusetts Institute of Technology for four weeks, beginning June 13. This program is offered by the Department of Mechanical Engineering, under the auspices of the Committee on the Summer Session.

Lectures will be held on three general subjects — "Timber," "Concrete" and "Strength Problems." Two seminars will be held during the course to afford opportunity for presentation of recent developments in the field of structure of metals and structural stress analysis.

Due to limitation of laboratory facilities, admission to the program will be in order of application. Those intending to take part should register by June 1.

Further particulars may be had by communicating with Professor J. M. Lessells, Department of Mechanical Engineering, Massachusetts Institute of Technology, Cambridge, Mass., who is in charge of this program.

Appointments Open in Research Work at Battelle

For the third consecutive year, four appointments as research associates are being made available at Battelle Memorial Institute, Columbus, Ohio. These appointments are open to graduates of any accredited college or university who have demonstrated marked aptitude for scientific research in the field of chemistry, physics, metallurgy or ceramics.

Appointments as research associate will be for one year's duration. The salary will be \$1800 a year.

Research associates will be expected to devote their entire time to work on a selected research project approved by the director and supervised by members of the technical staff. Research projects will be of fundamental or general character leading to the publication of information that will be useful to science and industry.

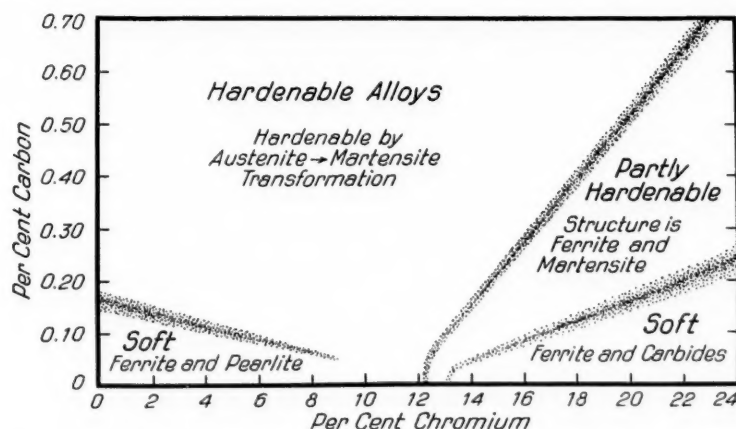
Application forms and further information may be secured by writing to Clyde E. Williams, director, Battelle Memorial Institute, Columbus, Ohio.

steels which is widely used in industry and which is austenitic at all temperatures below melting. These steels are of course not quench-hardenable because they cannot be produced in the martensitic condition. The best known composition is 18% chromium with 8% nickel and low carbon.

Stainless Steel and Stainless Iron

From prehistoric times until the middle of the last century, a distinction was recognized between steel and iron, in that steel would harden on accelerated cooling and iron would not. This distinction broke down under commercial pressure about the middle of the last century, but there is a tendency to revert to it in modern metallurgical discussions.

One evidence of this is a terminology which describes as "stainless irons" those chromium alloys which are too low in carbon to be hardenable, and to apply the term "stainless steels" to the hardenable varieties. The austenitic alloys are called steels because they are capable of hardening by very special forms of heat treatment.



Rough Subdivision of Chromium-Iron Alloys Showing How Carbon Influences Their Hardenability. (Bain)

New Small Gas Furnace Available at Low Price

A small gas furnace which requires no auxiliary air has been developed by A. F. Holden Co., New Haven, Conn.

The furnace can be made to the following three pot sizes: 8x12 in., 10x14 in., 12x16 in. Prices are \$110, \$162, and \$210 respectively.

Automatic control can be had at low

cost, the unit including control valve, nickel thermocouple, and lead wire selling for \$300, \$357, and \$416 for the 8x12-in., 10x14-in., and 12x16-in. sizes.

The flexibility of these units and the low cost will enable many of the small shops to make use of this equipment for case hardening or for heat treatment of tools. It will furnish methods of hardening that are not only practical, but as up-to-date as plants who can afford to invest in larger units.

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Positions Open

SALESMAN: Heat treating material. Familiar with heat treating salt bath method. State age, experience, and remuneration expected. Salary and commission. Chicago territory. Box 4-25.

YOUNG BRAZILIAN metallurgical or mechanical engineer, graduate of U.S. engineering college or university, for training with important company for service in Brazil. Write fully regarding qualifications. Box 4-30.

YOUNG LATIN AMERICAN metallurgical or mechanical engineer, graduate of U.S. engineering college or university, for training with important company for service in South America. Write fully regarding qualifications. Box 4-35.

SALESMEN: Manufacturer of new product for heat treating and other branches of industry wants to tie up with representatives already selling this field. Product is being advertised in national campaign and liberal arrangements will be made with men well established in this field. Box 4-45.

Positions Wanted

COLLEGE MAN: Married; age 29. Nine years mill and sales experience with large tool and alloy steel manufacturer. Desires connection in industrial advertising or publicity. Preferably New York City but will go anywhere. Available immediately. Box 4-20.

METALLURGIST: Age 28. Five years metallurgical training Carnegie Institute of Technology; eight years experience in metallography, heat treatment, physical testing, chemical analysis, and foundry in iron and steel. Box 4-5.

SALESMAN: Has been district manager for important firm handling alloy steel and iron for past seven years. Has operated foundry departments, sold foundry equipment, malleable and gray cast iron. Can operate melting department. Box 4-50.

METALLURGIST: Ten years experience in large steel plant; metallurgical aspects of steel making and rolling, steel plant maintenance including plant and laboratory work. Employed. Technical graduate. Box 4-15.

METALLURGIST: Age 26; B.S. Penn State 1934. Three years experience as chemist, metallurgist, and electric melting shop foreman in steel works and iron foundry; special training and experience in furnace design, refractories, melting research, and physical metallurgy. Will go anywhere and accept a very moderate salary in order to secure position with opportunity for advancement. Box 4-10.

SALES AND SERVICE EXECUTIVE: Metallurgical engineer, steel mill trained. Five years experience in sales and servicing of steel and allied products; nine years aggressive managing technical sales and service and directing introduction, marketing, and practical research of chromium-nickel alloys and heavy chemicals to steel mills, foundries, drop forging, automobile and general steel consuming industries. Box 3-20.

METALLURGIST: B. Met. E., M.Sc. Six years experience as metallurgical assistant and routine chemist in steel tube plant; four years non-technical business experience. Desires connection with plant that processes steel tubing for automotive use. Cleveland district preferred but not essential. Age 35. Available June 15. Box 3-55.

METALLURGIST: 35, with ability to inspire study and organize and direct research, desires to enter educational field. Doctorate in metallurgy from recognized school; eight years varied industrial experience. Publications; excellent references. Box 3-60.

METALLURGIST: Technically trained, extensive industrial experience in heat treatment, forging and gray iron practices. Familiar with plant operations and control with materials. Now engaged in research and development work. Box 4-40.

CHAPTER CALENDAR

MAY

CHAPTER	DATE	PLACE	SPEAKER	SUBJECT
Baltimore	May 2	Engineers Club	Louis Moses	Flow of Steel in Rolling
Boston	May 6	Massachusetts Institute of Technology	R. F. Harrington	Recent Progress in Cast Iron
Boston	May 20	Massachusetts Institute of Technology		New England Regional Meeting
Calumet	May 10	Woodmar Country Club, Hammond, Ind.	H. W. Graham	Steel Making Processes and Metallurgical Requirements
Chicago	May 12	Medinah Club	Norman B. Stotz	High Speed Steel
Cincinnati	May 12	Alms Hotel		Carborundum Co. film
Cleveland	May 2	Cleveland Club	F. M. Becket	Stainless Steel
Columbus	May 21	The Trees		Election and Picnic
Dayton	May 11	Engineers Club		Panel Discussion
Detroit	May 9	Hotel Fort Shelby	J. R. Townsend H. M. Webber	Special Purpose Metals Electric Furnace Brazing
Hartford	May 10	Bristol Brass Corp.	J. L. Christie	Common Wrought Brasses
Indianapolis	May 16	Washington Hotel		Round Table Discussion
Los Angeles	May 12	Southern Calif. Edison Co.		Materials Used in Aviation
Mahoning Valley	May 9	Tod Hotel, Youngstown		Inaugural Meeting
Milwaukee	May 19	Milwaukee Athletic Club	J. H. Mathews	Criminology
Montreal	May 2	Windsor Hotel	G. B. Waterhouse	
New Haven	May 12	Strathcona Hall, Yale University	G. B. Waterhouse	Steel Making
New Jersey	May 9	Essex House, Newark	G. B. Hogaboom	Metal Coatings
New York	May 9		N. L. Deuble	Metallurgical Inspection
North West	May 10			Annual Meeting
Notre Dame	May 11	Engineering Auditorium, University of Notre Dame	V. N. Krivobok	Corrosion Resisting Alloys
Ontario	May 6	Toronto	E. C. Bain	Basis of Steel Hardenability
Oregon	May 6			Annual Meeting
Penn State	May 20 and 21	State College, Pa.		Third Biennial Pennsylvania Inter-Chapter Meeting
Pittsburgh	May 12	Roosevelt Hotel	John Chipman	Segregation in Rimming Steel Ingots
Rochester	May 9	University of Rochester		
Saginaw Valley	May 10	Bancroft Hotel, Saginaw, Mich.	Carl F. Joseph	Malleable Iron
Schenectady	May 24	Wolferts Roost Country Club, Albany		Annual Meeting
Southern Tier	May 16	Elmira, N. Y.	F. E. Tuttle	High Speed Photography
Syracuse	May 10			Annual Banquet
Texas	May 5			Annual Meeting
Tri-City	May 10	Rock Island Arsenal	Roy Allen	Trouble Shooting on Steel Problems
Washington	May 9	Dodge Hotel	G. B. Waterhouse	National Officers Night
Worcester	May 5	Sanford Riley Hall, Worcester Polytechnic Institute		Symposium on Quenching

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
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